Click link below for interactive Pear Deck PowerPoint Lesson:

https://app.peardeck.com/student/tsyvktlem

SSS SAS ASA AAS

Proving Triangles Congruent: SSS, SAS
Proving Triangles Congruent: ASA, AAS

*Use your foldable! Workbook page 295

Content Objective
Students will use SSS, SAS, ASA, AAS to prove triangles congruent.

McGraw Hill

Florida's B.E.S.T. Standards for Mathematics

MA.912.GR.1.2 Prove triangle congruence or similarity using Side-Side-Side, Side-Angle-Side, Angle-Side-Angle, Angle-Angle-Side, Angle-Angle and Hypotenuse-Leg.

MA.912.GR.1.3 Prove relationships and theorems about triangles. Solve mathematical and real-world problems involving postulates, relationships and theorems of triangles.

MA.912.GR.1.6 Solve mathematical and real-world problems involving congruence or similarity in two-dimensional figures.
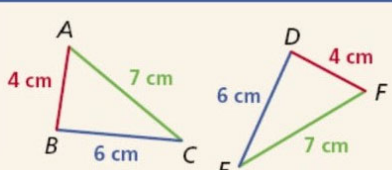
Learn
Proving Triangles Congruent: SSS

Proving Triangles Congruent: SSS

Postulate 5.1: Side-Side-Side (SSS) Congruence

If three sides of one triangle are congruent to three sides of a second triangle, then the triangles are congruent.

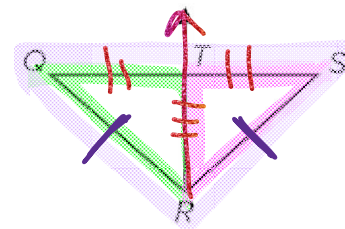| Postulate 4-4-1	Side-Side-Side (SSS) Congruence	
POSTULATE	**HYPOTHESIS**	**CONCLUSION**
If three sides of one triangle are congruent to three sides of another triangle, then the triangles are congruent.	A 4 cm, 7 cm, B 6 cm C / D 4 cm F 6 cm E 7 cm	$\triangle ABC \cong \triangle FDE$

Students, draw anywhere on this slide!

Pear Deck Interactive Slide
Do not remove this bar

Example 1
Use SSS to Prove Triangles Congruent

Prove that $\triangle QRT \cong \triangle SRT$.

Given: $\triangle QRS$ is isosceles with $\overline{QR} \cong \overline{SR}$. $\overrightarrow{RT}$ bisects $\overline{QS}$ at point T.

SSS

Prove that $\triangle QRT \cong \triangle SRT$.

Given: $\triangle QRS$ is isosceles...
$\overline{QR} \cong \overline{SR}$. $\overrightarrow{RT}$ bisects
Proving Triangles Congruent: SSS, SAS $\cong \triangle SRT$

Example 1
Use SSS to Prove Triangles Congruent

Proof:

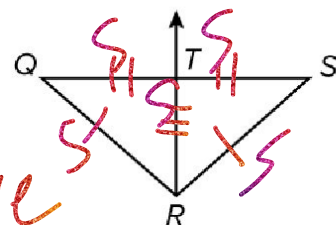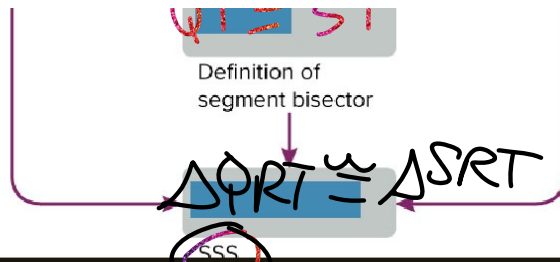| $\triangle QRS$ is isosceles with $\overline{QR} \cong \overline{SR}$.	$\overrightarrow{RT}$ bisects $\overline{QS}$ at point T.	$\overline{RT} \cong \overline{RT}$
Given	Given	Reflexive
	$\overline{QT} \cong \overline{ST}$	
	Definition of segment bisector	

SSS
SAS
ASA
AAS

Definition of
segment bisector

$\triangle QPRT \cong \triangle SRT$

SSS

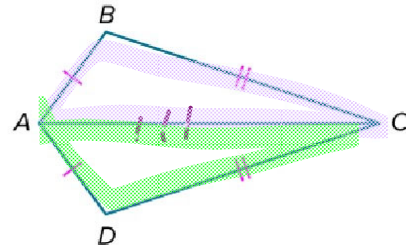## Example 1
Use SSS to Prove Triangles Congruent

Check

Complete the proof.

Given: $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{DC}$

Prove: $\triangle ABC \cong \triangle ADC$

SSS

Statements	Reasons
1. $\overline{AB} \cong \overline{AD}$ and $\overline{BC} \cong \overline{DC}$	1. Given
2. $AC \cong AC$	2. Reflexive
3. $\triangle ABC \cong \triangle ADC$	3. SSS

Learn
Proving Triangles Congruent: SAS

Angle in middle

Postulate 5.2: Side-Angle-Side (SAS) Congruence

If two sides and the included angle of one triangle are congruent to two sides and the included angle of a second triangle, then the triangles are congruent.

Postulate 4-4-2 **Side-Angle-Side (SAS) Congruence**

POSTULATE	HYPOTHESIS	CONCLUSION
If two sides and the included angle of one triangle are congruent to two sides and the included angle of another triangle, then the triangles are congruent.		$\triangle ABC \cong \triangle EFD$

Example 3
Use SAS to Prove Triangles Congruent

Example 3
Use SAS to Prove Triangles Congruent

PLAYGROUND The playground equipment shown appears to be made of congruent triangles. If $\overline{KL} \cong \overline{LM}$ and $\angle JLK \cong \angle JLM$, write a two-column proof to prove that $\triangle JLK \cong \triangle JLM$.

(handwritten: S ∥ ≅ A, S, # 2)

Given: $\overline{KL} \cong \overline{LM}$, $\angle JLK \cong \angle JLM$

Prove: $\triangle JLK \cong \triangle JLM$

Students, draw anywhere on this slide!
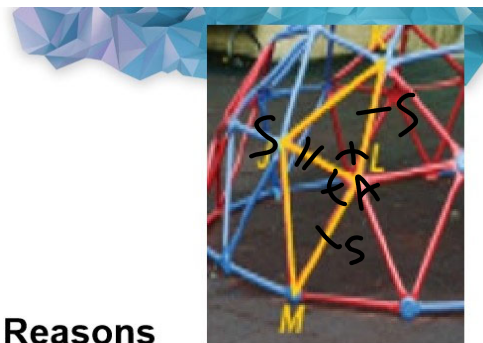

Example 3
Use SAS to Prove Triangles Congruent

Proof:

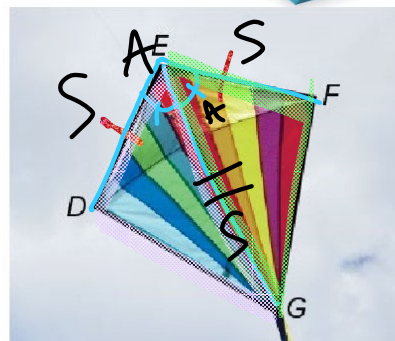| Statements	Reasons
1. $\overline{KL} \cong \overline{LM}$	1. Given *(handwritten)*
2. $\angle JLK \cong \angle JLM$ *(handwritten)*	2. Given
3. $\overline{JL} \cong \overline{JL}$ *(handwritten)*	3. Reflexive Property of Congruence
4. $\triangle JLK \cong \triangle JLM$	4. SAS *(handwritten)*

Students, draw anywhere on this slide!

Example 3
Use SAS to Prove Triangles Congruent

Check

KITES The kite shown appears to be made up of congruent triangles. If $\overline{DE} \cong \overline{FE}$ and $\overline{EG}$ bisects $\angle DEF$, prove that $\triangle DEG \cong \triangle FEG$.

Complete the two-column proof.

(handwritten: S A S, SSS, SAS, ASA, AAS)

bisects ∠DEF, prove that △DEG ≅ △FEG.

Complete the two-column proof.

AAS

Given: $\overline{DE} \cong \overline{FE}$, $\overline{EG}$ bisects ∠DEF.

Prove: △DEG ≅ △FEG   **SAS**

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Example 3
Use SAS to Prove Triangles Congruent

Proof:

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Statements	Reasons
1. $\overline{DE} \cong \overline{FE}$	1. Given
2. $\overline{EG}$ bisects ∠DEF.	2. Given
3. ∠DEG ≅ ∠FEG	3. Definition of angle bisector
4. $\overline{GE} \cong \overline{GE}$	4. Reflexive
5. △DEG ≅ △FEG	5. SAS

Learn
Proving Triangles Congruent: ASA

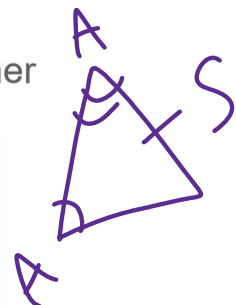**side is in the middle**

Postulate 5.3: Angle-Side-Angle (ASA) Congruence

If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.

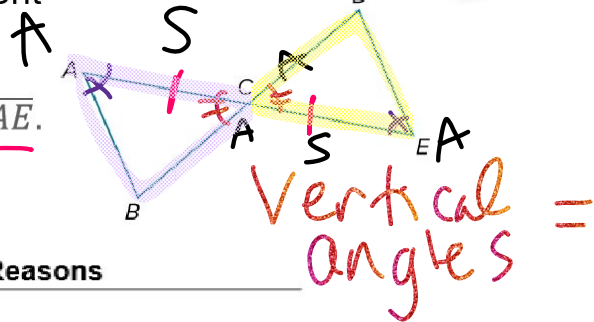| Postulate 4-5-1	Angle-Side-Angle (ASA) Congruence	
POSTULATE	**HYPOTHESIS**	**CONCLUSION**
If two angles and the included side of one triangle are congruent to two angles and the included side of another triangle, then the triangles are congruent.		△ABC ≅ △DEF

A S A

Example 1
Use ASA to Prove Triangles Congruent

Write a proof.

Given: $\angle BAC \cong \angle DEC$; $\overline{BD}$ bisects $\overline{AE}$.

Prove: $\triangle ACB \cong \triangle ECD$ ASA

Handwritten diagram labels: A S C S A, Vertical angles =

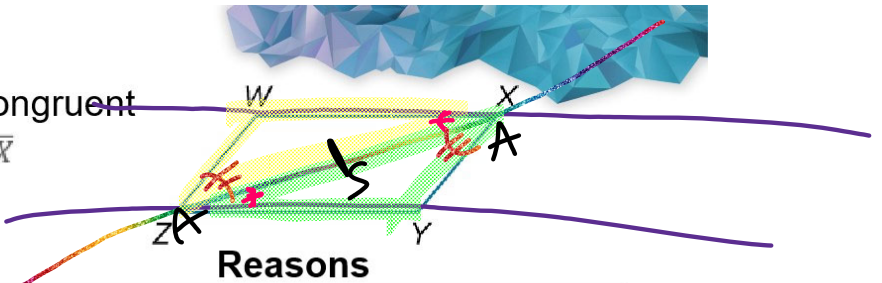| Statements	Reasons
1. $\angle BAC \cong \angle OEC$	1. Given
2. $\overline{BD}$ bisects $\overline{AE}$.	2. Given
3. $\overline{AC} \cong \overline{EC}$	3. Definition of segment bisector
4. $\angle ACB \cong \angle ECD$	4. Vertical angles
5. $\triangle ACB \cong \triangle ECD$	5. ASA

Example 1   parallel ||
Use ASA to Prove Triangles Congruent

Given: $\overline{WX} \parallel \overline{YZ}$ and $\overline{WZ} \parallel \overline{YX}$

Prove: $\triangle WXZ \cong \triangle YZX$

Handwritten: 90° perpendicular ⊥

Statements	Reasons
1. $\overline{WX} \parallel \overline{YZ}$	1. Given
2. $\overline{WZ} \parallel \overline{YX}$	2. Given
3. $\angle WXZ \cong \angle YZX$	3. Alternate Interior Angles
4. $\angle WZX \cong \angle YXZ$	4. Alternate Interior Angles Theorem
5. $\overline{ZX} \cong \overline{ZX}$	5. Reflexive Property of Congruence
6. $\triangle WXZ \cong \triangle YZX$	6. ASA

Learn
Proving Triangles Congruent: AAS

Theorem 5.5: Angle-Angle-Side (AAS) Congruence   *side on the end (NOT middle)*

Theorem 4-5-2	Angle-Angle-Side (AAS) Congruence	
THEOREM	**HYPOTHESIS**	**CONCLUSION**
If two angles and a nonincluded side of one triangle are		

If two angles and a nonincluded side of one triangle are congruent to the corresponding angles and nonincluded side of another triangle, then the triangles are congruent.
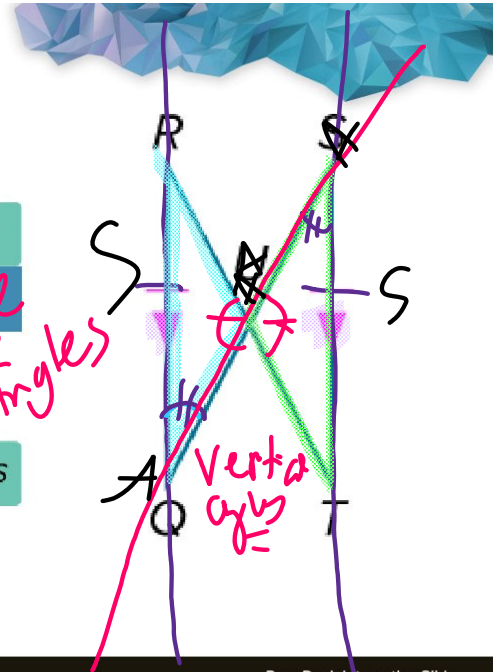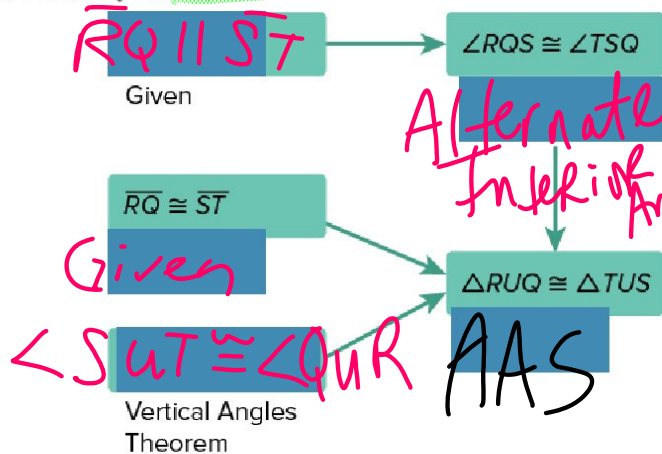
(handwritten) middle

$\triangle GHJ \cong \triangle KLM$

Example 3
Use AAS to Prove Triangles Congruent

(handwritten) parallel

Given: $\overline{RQ} \cong \overline{ST}$ and $\overline{RQ} \parallel \overline{ST}$

Prove: $\triangle RUQ \cong \triangle TUS$

$\overline{RQ} \parallel \overline{ST}$ → $\angle RQS \cong \angle TSQ$
Given

(handwritten) Alternate Interior Angles

$\overline{RQ} \cong \overline{ST}$ → $\triangle RUQ \cong \triangle TUS$

(handwritten) Given

(handwritten) $\angle SUT \cong \angle QUR$

(handwritten) AAS

Vertical Angles Theorem

(handwritten) Verta cys

Example 3
Use AAS to Prove Triangles Congruent

Given: $\angle DAC \cong \angle BEC$ and
$\overline{DC} \cong \overline{BC}$

Prove: $\triangle ACD \cong \triangle ECB$

Proof:

Statements	Reasons
1. $\angle DAC \cong \angle BEC$	1. Given
2. $\overline{DC} \cong \overline{BC}$	2. Given
3. $\angle C = \angle C$	3. Reflexive
4. $\triangle ACD \cong \triangle ECB$	4. AAS